55142. 16.3 (73) SECTION IV.—RIVERS AND FLOODS.

RIVERS AND FLOODS, JANUARY, 1915.

By Alfred J. Henry, Professor of Meteorology, in charge of River and Flood Division.

[Dated: Washington, D. C., Mar. 3, 1915.]

Georgia and the Carolinas.—There were three periods, each exceeding 24 hours, of steady, but not especially heavy rainfall, over the South Atlantic States during the month. The first period occurred between the 5th and the 7th, although the great part of the rain fell on the 6th. The second period occurred on the 12th to 13th and was the shortest of the three. Had the rivers been at a lower stage in the beginning it is doubtful whether flood stages would have been reached. The third period included the 17th and 18th, with the heaviest rain in Georgia on the 17th. This latter period was one of very general rains continuing practically 48 hours over Georgia and the Carolinas.

As a result of the rains the rivers were at relatively high stages throughout the month, with flood or freshet stages about the 8th, 13th, 19th, and other dates.

Alabama.—The Tennessee River in northern Alabama was above the flood stage on the 1st and 2d, but no damage resulted. The lower Tombigbee of Alabama was above the flood stage at Demopolis, Ala., on the 3d and again on the 24th and 25th. About 15 square miles of bottom land was overflowed.

Virginia, Maryland, and Pennsylvania.—The rain period of the 5th to 7th, as mentioned above, extended into the Middle Atlantic States on the 7th and caused the ice to break up in the Susquehanna River. Fortunately. it passed out on stages somewhat below the flood level.

The rains of the 12th and 13th were unusually heavy over the watershed of the Schuylkill River in southeastern Pennsylvania and caused a very rapid rise in that stream

on the 13th, the rise quickly subsiding.

Arizona.—Following the general heavy rains of the 28th to 30th, freshet conditions developed rapidly in the streams of the southern half of Arizona. In the Salt River and its tributaries considerably higher stages resulted than occurred in the freshets of December, 1914. By the morning of the 31st the crest of the rise had passed into the Gila River, below the mouth of the Salt.

Practically all of the floods were forecast, and in general but little preventable damage was sustained.

Statistics of flood loss during January, 1915.

State.	Tangible property.	Crops (gathered), and live stock.	Crops (pros- pective).	Suspension of business.	Saved by warnings, (estimated amount.)
menth Carolina	\$1,325	\$1,605	\$12,500	\$ 9,696 5,000	\$65,400 15,000 3,300
552 78.4	11/1	<u> </u>	<u> </u>		

SNOWFALL AT HIGH ALTITUDES, JANUARY, 1915.

[As summarized from the reports of Section Directors.]

Arizona.—Throughout January there was but little dition to the snow in the mountain districts until the decade of the month. The excessive precipitation the 28th and 29th occurred mostly in the form of snow

over the northern plateaus and ranges, at the higher levels of the central mountain districts, and over the east-central ranges, as far south as the Blue Mountains. In the more southerly ranges of the southeast, even at extreme elevations in some sections, the storm set in with rain, melting all, or a considerable part of the snow then remaining, and ended with snowfall insufficient in depth in most localities to reach the average for the season in past years.

Observers in nearly all sections particularly mention, in connection with their reports upon snow conditions, the prospect for an abundant water supply for agricultural and grazing purposes during the spring and early summer.—Robt. R. Briggs, Section Director.

California.—The snowfall in California during January, 1915, was considerably below the normal in most portions of the Sierra Nevada Mountains, only slightly below in the Siskiyou, and somewhat above normal in the mountains of southern California. The snow-covered area of the State was large at the beginning of the month, and, while January was decidedly stormy with heavy precipitation, the snow fields were greatly reduced by the rains which extended well into the mountains and melted the snow generally below the 3,000-foot level.—
G. H. Willson, District Forecaster.
Colorado.—In common with the three preceding months, the snowfall during January was less than normal on all watersheds the slight excesses occurring

normal on all watersheds, the slight excesses occurring here and there at moderate elevations failing to offset marked deficiencies near the Continental Divide. relatively scanty snow covering has permitted deep freezing. It follows that when melting sets in the runoff will be direct and rapid, and that the midsummer flow will be small, unless showers in the mountains make up

the deficit.

The depths at the end of January and on the corresponding date a year ago, respectively, were:

TABLE 1.—Snow on ground over Colorado, January, 1914 and 1915.

Watershed.		1914
South Platte North Platte Arkansas Rio Grande Grand Grand Gunnison Yampa and White San Juan and southwestern watersheds.	15	Inches. 23 23 21 24 36 41 33 35

-F. H. Brandenburg, District Forecaster.

Idaho.—The month of January opened with a marked deficiency in the supply of snow in the mountains of Idaho, except in the Panhandle. The precipitation of the month was almost everywhere below normal. Most of the precipitation occurring in the early days of the. month was in the form of snow, and measurements made on the 15th showed a considerable increase in depth. During the last week of the month there were a few days of abnormally high temperature, with warm winds and some rain, even in the higher mountains. These conditions materially reduced the depth of snow, but increased its density. While the conditions at the close of the

month were better than at the beginning, they were still far from satisfactory, the prospect being for a deficient flow of water in all the streams.—Edward L. Wells, Section Director.

Montana.—January, 1915, was the third consecutive month with deficient snowfall in the mountain regions of the State. With but a few local exceptions there was a pronounced deficiency in precipitation at lower altitudes and the snowfall in the high mountain ranges appears to have been correspondingly light. Practically all reports from high elevations agree that the depth of snow is much less than normal and that it is not as solidly packed as is usual at this season of the year. The outlook at the end of the month for a normal flow of water during the summer of 1915, so far as the supply depends upon the winter accumulation of snow, is therefore not favorable.—R. F. Young, Section Director.

New Mexico.—The month was cold, wet, and stormy, especially over that part of the State west of the one hundred and fifth meridian. More than twice the normal snowfall occurred. The average for the State was 7.1 inches, making a total average fall for the winter thus far of 19.1 inches.—Charles E. Linney, Section Director.

Nevada.—The snowfall for January, 1915, was below normal in all basins. There was an average of 27.7 inches in the Truckee Basin; 22.0 inches in the Carson Basin; 6.3 inches in the Walker Basin; and 6.1 inches in the Humboldt Basin. The greatest amount reported in the Truckee Basin was 45.5 inches, at Cathedral Park; in the Carson Basin, 22 inches at Markleeville; in the Walker Basin, 14.5 inches at Bridgeport; and in the Humboldt Basin, 21 inches at Eureka.—H. F. Alciatore, Section Director.

Oregon.—The snowfall in January, 1915, was very light and this was the third consecutive month with unusually deficient snowfall in the mountains of Oregon. Compared with last year, there was much less snow on all ranges, except on the eastern slope of the Cascade Mountains and at a few stations in the Blue Mountains, where somewhat greater depths were reported and that was fairly well packed. Compared with the normal there was considerably less snowfall in all sections, some stations reporting the least snow on the ground at the end of the year that has been known in 18 to 25 years. Under existing conditions the outlook for irrigation water during the coming season is unfavorable.—E. A. Beals, District Forecaster.

South Dakota.—The average snowfall in the elevated region of South Dakota, that is, the greater portion of the Black Hills region of the State, was 21.5 inches, which is much more than the normal.—M. E. Blystone, Meteor ologist.

Utah.—At the close of January the snow in the mountains of this State averaged much less than normal. Very nearly every correspondent reported amounts below the average, and that the prospective water supply, based on observations taken January 31, was below normal. Indeed, some report that the outlook was discouraging. The forest rangers report that the snow in all the forest reserves of this State was below normal, and, moreover, that the condition was favorable for early melting, while nearly all other observers reported

that the snow was loose and that there were very few drifts.—A. H. Thiessen, Section Director.

Washington.—Observers from many different localities of the State agree that the January snowfall was unusually light in the mountains and highlands, and that up to the present the total winter's snowfall has been the least in 20 years or more. In the foothills of the Blue Mountains it is reported that wells and springs are dried up that were not dry before in 17 years. In the valleys of the northeastern section of the State there is nearly as much snow on the ground as on the higher elevations, owing to the uniformly cold weather during the month, preventing the melting that usually occurs at the lower levels.

At the end of the month there was little snow below the 2,000-foot level west of the Cascade summits. On the eastern slope the average monthly snowfall was about 30 inches of loose snow, a little more than half of what fell a year ago during the same period. The average depth at the end of the month was 21 inches, whereas in 1914 it was 34 inches. The density, as determined at Bumping Lake, was 21 per cent, which would give a water equivalent of 4.41 inches for the average depth of 21 inches.

In the Okanogan highlands the monthly snowfall averaged 10 inches in the valleys, whereas in 1914 it was 22 inches. In the Blue Mountains there was considerably less snow than in the corresponding period of 1914.—

G. N. Salisbury, Section Director.

Wyoming.—While snow depths at elevations ranging from 6,000 to 10,500 feet averaged more than two and a half times as great as those at the close of the preceding month, yet nearly all observers report less than the normal amount for the season. The greater part of the snowfall occurred in the last half of the month, except in the Yellowstone Park, where it occurred in the first half. Owing to the absence of snow in the early part of the month the earth was frozen to an unusual extent and many mountain streams were frozen solid. As the temperature for the month averaged below normal, little snow disappeared by melting.

Estimates of density were made by observation, which showed an average water content. Measurements made at the end of the month at Centennial, near the base of the Medicine Bow Mountains, showed a density of 17 per cent. At high elevations the snow was reported as generally well packed by high winds and, consequently, of more than average density.

The average depths at the end of January and December, respectively, are given in Table 2.

Table 2.—Snow on ground over Wyoming, January, 1915, and December, 1914.

Station.	January.	December.
Big Horn watershed	Inches.	Inches.
Cheyenne	16	:
Green		1
Powder	137	
Snake	18	
Yellowstone	11	} :
Tongue. Gallatin and Madison	10 21	

⁻R. Q. Grant, Section Director.